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## New NSF Director Sets Out Policy Views

*The National Science Foundation, historically the major bankroll for general federal support of academic basic science, has a new chief: Edward A. Knapp, 50, a particle physicist who spent most his career at the Los Alamos National Laboratory. Knapp joined NSF in September as Assistant Director for Mathematical and Physical Sciences, and was appointed Director on November 2. The following text, edited for brevity and clarity, is from a tape-recorded conversation December 3 with SGR Editor Greenberg:*

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*SGR. When you were being considered for the job of Director, were any kind of marching orders or priorities presented to you? Did the President or [George] Keyworth [presidential Science Adviser] say this is what we'd like to have done at the Foundation?*

Knapp. I talked with Dr. Keyworth at some length. He's an old colleague and friend from Los Alamos. We discussed excellence and pertinence in research. Those are his words, but I happen to agree with them. I think we have to emphasize excellence in the research that we fund. Pertinence is a broad term, but it's pertinence to the industrial and defense needs of the country, pertinence to the intellectual life in the universities. It's not a narrow definition.

*SGR. No one is against excellence or pertinence.*

Knapp. It means that we have to set priorities, and that's the next thing. We have to decide what we'd like to emphasize and then we have to do it. The Foundation is fortunate in that it has very little that isn't pertinent, so it's going to be very difficult to decide where we want to have our priorities and where we don't. I think it's more a matter of where there are opportunities for rapid scientific advance.

*SGR. Is "pertinence" used in the context of the Administration's high priorities for industrial revival and defense?*

Knapp. A case which Dr. Keyworth made to me as an example is astronomy, where there has been a very exciting decade; we've had all kinds of really fantastic

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### *Two Top NSF Aides Fired*

Reports of a bloodletting at the National Science Foundation were circulating in Washington science-policy circles last week. But for several days, the only firm word—and it was extracted rather than announced—was that newly installed Director Edward A. Knapp had given 30 days' notice to NSF's Number Two, Donald N. Langenberg, Deputy Director since July 1980.

While acknowledging that move, Knapp also told SGR that Eloise E. Clark, Assistant Director for Biological, Behavioral, and Social Sciences since 1976, "probably will move on." Two days later, December 8, she announced her resignation.

Knapp, obviously sensitive to a November 2 report in the *Washington Times*, the capital's Moonie paper, that a political cleanout would take place at NSF, insisted to SGR that "there's no bloodletting here."

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## In Brief

**Since scientists and athletes are often assigned vanguard roles when chills recede in Soviet-American relations, SGR asked Presidential Science Adviser George A. Keyworth whether any post-Brezhnev gambits are in the works. Nothing at all, he replied, adding that "Everything depends on START"—a reference to strategic-arms negotiations.**

*James C. Sanders, head of the Small Business Administration, says that $45 million will flow this fiscal year into the newly enacted Small Business Innovation Research Program, which requires small-business set-asides from most major federal R&D agencies. By 1986, the sum may be as high as $400 million. To get on the mailing list for basic information and periodic announcements: SBIR, US Small Business Administration, 1441 L St. NW., Washington, DC 20416.*

**While the Administration has been talking about developing basic policies for the national labs, it has simultaneously been hacking away at them. Alvin W. Trivelpiece, Director of DOE's Office of Energy Research, told a Congressional hearing December 2 that "the overall funding levels in nondefense work are about 10 percent below the FY 1980 levels. Staff reductions at the non-weapons, multiprogram laboratories ranged from 10-20 percent."**

*The DOE research chief added, "I believe we are now back on the right track, without damaging the laboratories' core strengths and with the necessary scientific teams intact. This is a very important consideration," he said, "since such scientific teams may take 10 years to develop."*

# . . .Knapp Finally Acknowledged Firing

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The report was written by long-time NSF tormentor, George Archibald, a former Congressional aide and Reaganite in journalistic reincarnation.

The ouster of Langenberg—which he refuses to discuss—was handled in a fashion favorable to malicious speculations concerning the Reagan Administration's designs on the Foundation. Three weeks before the decision became publicly known, Knapp, according to the *New York Times* of December 8, said in an interview: "I'm not going to have any head-hunting campaigns at the Foundation. I'm not going to ask for any resignations."

When rumors began to circulate that the Office of Personnel Management had decreed the ouster of holdover presidential appointees at the Foundation, SGR was told by Presidential Science Adviser George A. Keyworth that he didn't know of any mandated or impending staff changes at NSF. "Ed is free to assemble his own team," Keyworth said, adding that "anything he wants to do, he will have our support."

In any case, when SGR finally asked Knapp on December 6 about reports of Langenberg's departure, he replied:

"I have asked him to leave. I feel I really need to build a team of my own." Knapp stressed two points: "Don is an old friend," and the soon-to-go Deputy Director has for some time been actively looking for another job. (Langenberg, a physicist, came to NSF from the University of Pennsylvania, where he was a laboratory director and Vice Provost for Graduate Studies and Research. For his first six months at NSF, he filled in as Acting Director, pending the delayed arrival of Director-designate John B. Slaughter; when Slaughter announced departure plans last summer, Langenberg was on a candidate list prepared by the National Science Board.)

Knapp told SGR that he wanted to fill the post regardless of Langenberg's job plans, "because it's better to start with fresh people." The new Director said he made the decision and conveyed it to Langenberg without having decided on a successor.

Knapp told SGR he gave the word to Langenberg "several weeks ago," but then called SGR back to say "it was just last week." Knapp, however, was uncommunicative on the question of whether the Langenberg ouster was his idea or whether he was ordered to make the post available for a Reagan appointee.

The maladroitly handled affair is red meat for science-policy purists, some of whom promptly took to the Washington grapevine with nostalgia-ridden allegations of an unprecedented assault on scientific integrity.

The fact is, as NSF oldtimers point out, that high-level changes of this sort are not unprecedented at the Foundation; several took place when a new Director came in at the beginning of the Carter Administration. The legal basis is unchallengeable, since the Director, the Deputy Director and a maximum of four assistant directors are presidential appointees who serve at the pleasure of the President.

As things work out, Clark's departure will leave all four presidential assistant directorships vacant: the spot for Education has been unfilled since NSF dropped out of science education; the post of Assistant Director for the Mathematical and Physical Sciences became vacant when Knapp was appointed NSF Director, and Francis S. Johnson, Assistant Director for Astronomical, Atmospheric, Earth, and Ocean Sciences, had previously made plans to return to Texas early next year.

So, with no more than a small bloodletting, Director Knapp will be able to appoint his own team.

Asked by SGR on December 7 whether confusion and ill-will might have been avoided by simply making public a statement of staff changes, Knapp replied, "In retrospect, I guess so."

That afternoon, Langenberg telephoned SGR and said that he had just sent the President a letter of resignation, effective December31. He said he plans to return to the University of Pennsylvania, from which he has been on leave.—DSG

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# . . .Knapp: Universities are in Bad Shape

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discoveries. And he feels, and I feel very strongly, that astronomy is ripe for new investment and it's an area where we can make great strides in basic science. It's pretty difficult to see a direct tie between astronomy and the industrial base. However, I believe it's there in the instruments they're building—the radio telescopes, the high-technology optical telescope, the computer systems which are used to analyze this data, the mathematics that is in the computers to understand the correlations and generate the images from the data. That's all very high technology and, in fact, does have almost direct relevance to our competitive position, even though the science that we're funding is basic science and isn't particularly focused toward a particular problem in the marketplace.

## *No Directions from Keyworth*

*SGR. What are some of the other issues that you and Keyworth discussed?*

Knapp. Dr. Keyworth believes that I have good taste in science, that I share his interest in basic science, and he will only be involved in setting policy at the Science Foundation if he feels that we as a team here are going off in the wrong direction. But as far as laying out a direction for us to go, absolutely not.

*SGR. Were there any political considerations in your appointment? For example, your own political background?*

Knapp. I've never been involved in partisan politics, although I am a Republican from family and historical connections. Mostly, I'm pretty apolitical. I do share a relatively conservative view of some aspects of fiscal policy, but I'm certainly not a partisan or political person. I have no background of being active in campaigns or anything like that.

*SGR. What are the main problems that you'll be dealing with as Director?*

Knapp. As an Assistant Director here, I found out a few things that actually surprised me. In particular, the state of science in the universities.

*SGR. In worse shape than you expected?*

Knapp. Much worse shape. It's different for the different disciplines. In mathematics, for example, since about 1968 or so, the Defense Department has basically dropped its support completely. And they were supporting 50 percent of mathematics in 1968. Also, the funding from NSF has kept level or dropped slightly for pure mathematics in that time. And what's happened is that the whole system of support for graduate and postdoctoral students has just sort of collapsed. The field is very active in some ways, and it's doing some really exciting things. In fact, I'm told that for the first time in many years, it's really outward looking; it's making good contact with physicists, with fluid mechanics, for example. And it's not just applied mathematics; some of the very basic mathematics is also being applied through applied mathematics to some of these things. But they really don't have a good number of young research people coming into the field. The infrastructure has sort of fallen apart on them. We have established two new math institutes in the past few years; they're just taking hold and will help a bit. But mathematics really needs to have additional support, or support switched around within their disciplines so that there is real support for postdoctoral and graduate students.

*SGR. How do you explain the side-by-side existence of scientific creativity and the difficulties you've described?*

Knapp. The problem isn't with the people who are doing the research. It's the replacement problem. That may already be turning around. But there also seems to be a lack of excitement in the graduate students themselves. They don't have that feeling of "I'm going into mathematics and I don't care that I'm never going to be rich. I'm going to discover this wonderful thing, the life of the mind, the life of the intellect is for me." There seems to be less of that than a generation ago.

## *Students Lack Enthusiasm*

*SGR. Do you find similar problems in other disciplines?*

Knapp. I find the problem of a lack of enthusiasm in some of the graduate students in most of the disciplines, but for different reasons. Chemistry, for example, has a tremendous problem with instrumentation. As George Pimentel [former NSF Deputy Director] said in Congressional testimony last spring, a young chemist really can't get started in a chemistry department. There's not enough money in a grant to instrument him with the modern equipment that he needs to start a new research program. In chemistry, what we need to do somehow is get the support per grant raised to a point where a young guy can really go at it and make a real solid contribution right away. Not all young chemists can become faculty members, but some should be able to. In chemistry, we have a program for young investigators, which we hope to expand more in the Foundation, to try to get these people who just got their PhDs a few years ago into a faculty and then funded so they can really become honest-to-goodness first-line scientists.

*SGR. There are a lot of complaints from the social*

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# . . .No Special Aid for the Social Sciences

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*and behavioral scientists.*

Knapp. I've only worried about the social sciences now for two weeks. The social sciences are, of course, much more controversial than the physical sciences, in terms of their impact on the body politic basically. In the social-sciences funding that we do in the Foundation there are some very important things, like the social surveys and the data bases for many social studies; these are absolutely invaluable to the whole country, not only for the sciences but also for the government. And those have suffered under the cuts that were mandated a couple of years ago when the budget ax fell fairly dramatically here. I just have to learn a great deal more about the social sciences. I think there's certainly some very, very good science done in the social sciences.

*SGR. How will you go about educating yourself in these fields?*

Knapp. I've been reading a great deal. There's a [National Science] Board report on the social sciences, which I have read. I've had some people in here to talk with me from the Consortium of Social Science Associations [a Washington-based organization comprising 10 social- and behavioral-science scholarly associations.] And they, in fact, emphasized mostly the data bases. But there's a lot more to the social and economic sciences than just that. The balance in the economic sciences between people of different views seems to be quite good, as far as I can tell. But in two weeks, I haven't had much chance to look at that carefully.

## *Emphasis on Basic Science*

*SGR. The social and behavioral sciences have suffered most at NSF under the Administration's austerity. Does that suggest that if any corrective measures are taken, they would be first in line for relief?*

Knapp. I don't think so. If corrective measures are taken, I'm sure they would participate. If there is a restoration of funds, I think this Administration's priorities are on reinvigorating the sciences in colleges and universities. There are problems in all of the sciences and I don't think we should expect to see the social sciences get the lion's share. I also don't think they would suffer any more unduly than they have.

*SGR. Is there an end in sight to the general austerity, or does the Foundation face at least a few more years of tight, essentially stationary budgets?*

Knapp. The Administration's science policy is to emphasize the role that basic science has in the knowledge base of the country and in the training of future scientists and technologists in our industry. It really has a very great leverage in terms of the future of the country's industrial output. I would hope that even in times of very, very tight budgets, we could see fit to emphasize the basic sciences, and science, not as education, but science as science, with the educational output that it has in the universities. We are quite a distance away from a budget for fiscal 1984, but the Administration certainly wants to emphasize science and technology, and particularly basic science.

## *Laboratory Instruments*

*SGR. The problems with instrumentation that you referred to before have been high on the Foundation's agenda for many, many years. Yet it doesn't seem that a great deal has been done about it.*

Knapp. That's true and yet it's not true. For example, in the [NSF] Mathematical and Physical Sciences Directorate, for many years it was felt that if we put off instrumentation, this year or next year we're going to have an increase in budget and we'll be able to buy that instrumentation. Last year, and in the year before a little bit, the Directorate cut back the number of grants they provided people—for almost the first time, and rather substantially—so that the grant size to investigators would go up to help buy instrumentation. So, there was a turnaround I think that even if we are successful in getting increased emphasis on basic research, the number of grants we are awarding to university investigators would not go up particularly; it would be mostly the size of the grant, support for postdoctoral people, for graduate students, for instrumentation, within those grants. That's the emphasis.

*SGR. What about the separate instrument fund that was proposed several years ago?*

Knapp. As Director, I don't like that. I think the instruments should be handled within the research grants themselves. We can take care of that without having a separately administered fund. I think we have 26,000 grants now every year in the Foundation, and if we have to have separate grants for instrumentation, separate from the research we do, it's just a tremendous load on our program officers. The instrumentation is needed for research. It isn't needed just to put on a bench somewhere.

## *Science Education Role*

*SGR. What role do you see for the Foundation in precollege science education?*

Knapp. I'm really pleased with the $15 million that the Administration and the Congress finally all got together and provided for us [in the FY 1983 budget, for education]. Of course, the [National Science Board] Commission [on Precollege Education in Mathematics, Science, and Technology] is very important in the long-

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# . . .Wants More Money for Science Education

*(Continued from page 4)*

term solution that the Foundation has toward a program for precollege science-teacher education, and education in general. Our fund is to be used for teacher training and re-education or updating. The Congressional language is very loosely worded, and the Foundation will be open, so that local school districts or universities can come forward with proposals which fit their local needs for retraining, or training, and it can be summer institutes, workshops. I think that the Foundation's biggest asset is not its budget but it's the people who receive the grants and do the work in the universities. I would like to see at least some of this money spent on trying to get active, participating-in-research university scientists involved with teachers from the high schools who need to be trained and made enthusiastic about science and how wonderful a scientific career really is. I would like to see us develop a mechanism that somehow gets these two groups of people communicating and working with one another. And the university researchers are really excited about doing that. I have talked to the [NSF] advisory committees for mathematics, chemistry, materials research, computer sciences. On all of these committees many of the people are already working and worrying about that and would very much like to have a formal way, a structured way for them to interact with the high school teachers and try to help with this problem, which they consider a crisis. And I do, too. We really aren't getting people through our high schools in the numbers we need who are prepared to go into a scientific career.

*SGR. Can the Foundation do more than light the path?*

Knapp. Education is a $180-billion business and we have $15 million to solve all the problems. It's ridiculous. We can't possibly even come close to really making a frontal assault on that problem.

## *Science and Security*

*SGR. Will you be seeking additional funds for education next year? The $15 million did not originate with the Administration.*

Knapp. That's correct. The Science Foundation would very much like to see additional funds next year in this program.

*SGR. What is your reaction to the recent National Academy of Sciences report on* Scientific Communication and National Security *(SGR Vol. XII, No. 17)?*

Knapp. I have always personally in my own science been relatively international in what I've done. I've collaborated with people in France and Germany at CERN [European Center for Nuclear Research], where I've done most of my work, and in Switzerland at the Institute for Nuclear Research. Science is an international undertaking, and at the basic science level, an absolutely free flow of information is essential for the fields to progress and prosper. I agree with the report that there have been abuses, that there has been technology transfer out of the United States which wasn't necessary and probably was damaging, but it's primarily information in the technological sector and it doesn't originate in the universities and colleges of this country.

## *"Security through Accomplishment"*

*SGR. Do you share any of the concerns that have been expressed that Soviet exchange students and researchers have been engaging in espionage on American campuses?*

Knapp. I don't have enough information to say. I've had Soviet visitors to my research installation [at Los Alamos] and have never seen any particular indication of espionage activities, and that was a relatively sensitive place.

*SGR. Would you favor adopting the Defense Department's requirement that its grantees simultaneously send its agencies copies of papers when they're submitted for publication? Defense requires that even with basic research activities.*

Knapp. I would be opposed to such a provision for the Foundation, except in very special instances, which we already have, for example, in cryptology. I wouldn't even know how to handle it. I would be opposed to it. I don't think it would be at all useful.

*SGR. Do you agree with the concept of "security through accomplishment" in the Academy report?*

Knapp. Absolutely. I think that the only way we can, in fact, maintain our competitiveness, industrially and in defense, is by doing a better job of research and development and technology utilization than our friends or our adversaries.

*SGR. It's often said that the US has lost the lead in science. What do you see as our present place in the world of science and what are the trends?*

Knapp. Our financial support of science is more or less constant and has been for 15 years. The financial level of support for science in other countries has, over the last 15 years, come from about half to about equal to our share of gross national product. The other countries are on a rising curve of investment, while we've been on a relatively constant curse of investment. It was easy to develop an enthusiasm and excitement when next year you're going to get a little more support than this year. In that sense, there's perhaps more enthusiasm in some of the foreign laboratories than you

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# House Money Bill Provides Boost for NIH

*While the NIH budget for fiscal 1983 is among a large backlog of appropriations legislation facing the vagaries of the lame-duck session of Congress, the biomedical research community has grounds for cheer, regardless of the outcome: Through persistent missionary work, it has developed a firm and influential friend on Capitol Hill—the House Appropriations Subcommittee on Labor and Health and Human Services, chaired by Rep. William H. Natcher (D-Ky.). The following excerpts are from the report accompanying the Subcommittee's vote to appropriate $4 billion for NIH—$255 million above the Reagan request, and a respectable $362 million above the current budget:*

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The backbone of biomedical research in this country is the grant-support, provided by the Federal government through NIH, for research projects initiated and carried out by individual investigators. In an effort to stabilize the support available for this most important of all the activities of NIH, the Committee concluded several years ago that funds should be available each year to award about 5,000 grants for new projects or for competing renewals (i.e. on-going projects that have reached the end of their period of committed support, usually 3 years). It was the consensus of well-informed officials and public witnesses that such a level of support would be adequate to maintain a reasonable momentum of medical research in this country—which leads the world in the breadth and quality of its accomplishments.

NIH was able to award 5,100 grants for new and competing projects in FY 1981. During the past year this figure dropped to 4,740 but the projection is that only 4,100 awards could be made in FY 1983 with the funds requested for this purpose in the Budget—due to the combined effect of an 8 percent reduction in the funds available and an 8 percent increase in the average cost of research projects. The Committee has therefore allocated an additional $101,213,000 to the Institutes for the support of investigator-initiated research projects. It is estimated that this will bring the number of

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## Knapp

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find in ours. But that's our problem. I would like to see more of our resources put into basic research at universities. But if that's impossible, we still can restructure things so that we support science in a way that we get that enthusiasm back. I don't think we have to be losing our place in science in the world.

*SGR. Keyworth made a bit of stir when he first took office, when he said that there had been too much toleration of scientific mediocrity and that a good deal of fat had gotten into the system. Do you agree with that?*

Knapp. There are parts of the scientific community, particularly some of the applied-research activities, which I'd have to call mediocre. And, of course, the Science Foundation probably has some fraction of its grants that it gives which are really not the most exciting possible science that exists. But I think on the whole university science is pretty much first class.

*SGR. Do you think we're spending too much on defense research?*

Knapp. I think it's important that Defense support research. But I believe that the Defense Department focuses its research on areas of its interest much too tightly. I would like to see the Defense Department expand its research base. But I would like to see it do it in a more undirected way and more towards the universities and more towards basic research in its own laboratories and other government laboratories, and less directed toward specific mission goals. It should spend more of its R&D budget on basic research. In fact, it spends very, very little of its basic research budget on basic research. For example, in mathematics, when you investigate what it is that the Department of Defense funds in mathematics—it's basic, in a sense, but it's not really investigator-generated basic research. It's not in the direction that the nose of the mathematician has taken it. It's in the direction that the Department of Defense feels there is interest for its programs. I've discussed with Admiral Kollmorgen, the Chief of Naval Research, about how he can better get basic research funded out of the Office of Naval Research like it was in the grand old days of the '50s. The ONR realizes that since the Mansfield Amendment, they really haven't gotten back into support of basic research at the universities, and they feel a need to really do that.

*SGR. It's often said that this is not a good time for a young person to go into science. Do you sympathize with that?*

Knapp. I would absolutely not sympathize with that at all. I have two children in graduate school right now who are heading for research careers, and I've encouraged them to do that. I think it's a field where you will never get rich, but you certainly will have a creative and fulfilling life. The vicissitudes of funding and the ups and downs of the job market—they're there, sure, they're there in any field. But the excitement of discovery makes up for an incredible amount of lack of resources. If I were a young person, I would certainly want to be a scientist again.

# . . .Reverses 10-Percent Cut in Indirect Costs

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such grants to about 4,900.

The Committee endorses efforts by the National Institutes of Health to support as many meritorious research projects as possible within available funds, but is not convinced that uniform, across the board, reductions in either direct or indirect costs is an effective way to accomplish this goal.

The 1983 budget requests for the National Institutes of Health and the Alcohol, Drug Abuse, and Mental Health Administration were based on a proposed new policy with respect to the payment of indirect costs of research projects. Instead of paying the full indirect costs calculated for each project, only 90 percent of these costs would be paid, beginning in fiscal year 1983. The institutions (primarily universities) conducting the research would be required to absorb the remaining 10 percent. In 1983 the total indirect costs associated with NIH-supported research are estimated at $693 million.

The Committee has provided sufficient funds to restore the proposed 10 percent across-the-board reduction in indirect costs on research grants and directs the Department of Health and Human Services to continue the practice of paying full indirect costs with respect to research in fiscal year 1983. . .

## *Raises Funds for Training*

The Committee is persuaded that indirect costs are a legitimate component of the costs incurred in performing biomedical research and should be adequately reimbursed. The Committee is also concerned by the widespread perception that Federally sponsored research may be bearing more than its fair share of these costs. The indirect cost level as a percentage of the total costs of research grants has increased from 15 percent in 1966 to 20.5 percent in 1972, and 29.5 percent in 1981. In 1980 and 1981 reimbursements for indirect costs grew faster than the general inflation rate, whereas direct costs of doing research did not. The Committee requests the Secretary of Health and Human Services, in cooperation with the NIH Director, to make a careful review of this matter, including consultation with the universities and other research organizations mostly directly affected, and to submit a report setting forth conclusions and appropriate recommendations to the Committee for discussion in advance of hearings on the 1984 budget request. The committee also intends to ask the Comptroller General to make another independent review of the subject.

The future vigor of biomedical research obviously depends on the continued availability of new entrants into the field with new ideas, new approaches and new enthusiasms. In recognition of this, the Committee has sought to provide stable support for the research-training programs of NIH. In this area there has also been some slippage; the number of people being trained under NIH research training grants (counted as full-time equivalents) was 11,200 in 1979; 10,650 in 1980; 10,700 in 1981; and 9,700 in 1982. As most of the research-training programs take several years, having about 10,000 young scientists in training in the biomedical sciences at the graduate level at any one time will yield not more than about 3,000 competent new investigators in any one year—a figure which the Committee believes is hardly enough to balance the inevitable attrition from active paticipation in research. The Budget request provides for only about 8,900 research-training slots in FY 1983 and the Committee has therefore included increases for the research-training programs totalling $18,625,000 to bring the total number of trainees to 10,000.

## *Physician-Researchers*

The Committee shares the concerns that have been expressed by official and public witnesses about the difficulty of recruiting and retaining physicians for research careers, especially as all clinical research, involving human patients, must be done by—or, at least, under the guidance and supervision of—a qualified physician. It is apparent, and understandable, that young physicians considering careers in health research are often dissuaded from applying for research training or fellowships by their perception of instability in the Federal commitment to research and by their awareness that a research career represents a substantial financial sacrifice when compared with almost any form of medical practice. The Committee would like NIH to review this problem carefully and to suggest what steps might usefully be taken. . .


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# Study Foresees Slump in Higher Education

Present trends suggest a substantial shrinkage at the higher levels of the American educational enterprise by the end of this decade, according to *Projections of Educational Statistics to 1990-91,* prepared by the National Center for Education Statistics. But the Center foresees a slight upturn in elementary and secondary enrollments, teaching jobs, and "real" spending. Among the major changes:

- Full-time equivalent enrollment in all institutions of higher education:—From 8.7 million in 1980 to 8.4 million in 1990;
- High school graduates from all public and private schools:—From 3.1 million in 1979 to 2.4 million in 1990-91;
- Bachelor's degrees granted by institutions of higher education:—From 929,417 in 1979-80 to 922,000 in 1990-91;
- Full-time equivalent instructional staff in institutions of higher education:—From 624,000 in 1980 to 589,000 in 1990;
- Total expenditures of institutions of higher education:—From $70.4 billion in 1980-81 to $66.6 billion in 1990-91 (1980-81 dollars);
- Enrollment in all regular public and private elementary and secondary schools:—From 46.1 million in 1980 to 46.7 million in 1990;
- Full-time equivalent teachers in all regular public and private elementary and secondary schools:—From 2.4 million in 1980 to 2.6 million in 1990;
- Total expenditures of all regular public and private elementary and secondary schools:—From $117.9 billion in 1980-81 to $138.8 billion in 1990-91 (in 1980-81 dollars).

Copies of Volume I are available for $6.00 each from the Superintendent of Documents, USGPO Office, Washington, D.C. 20402 (request stock number 065-0000-00144-6). Volume II is available for $4.75 per copy (s/n 065-000-00151-9). For more information about the Center's statistical program, contact the Statistical Information Office, National Center for Education Statistics, (Mail Stop 1001), 400 Maryland Avenue, SW., Washington, D.C. 20202, telephone (301) 436-7900.

## *Science* Writer Joins *Times*

William J. Broad is the latest member or alumnus of the *Science* magazine News and Comment staff to join the *New York Times.* Broad, who will be based in New York as a member of the science-news department starting in January, was preceded to the *Times* in recent years by *Science* staffers Philip M. Boffey and Nicholas Wade. Just recently, Bryce Nelson, a *Science* alumnus, went there via the *Los Angeles Times.*

## *NSF Director Names Aide*

Richard S. Nicholson, a member of the National Science Foundation since 1970, has been appointed to the senior staff position in the office of the newly appointed NSF Director, Edward A. Knapp. Nicholson, former Director of the NSF Chemistry Division, will continue as Executive Director of the Commission on Precollege Education in Mathematics, Science, and Technology.

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## SGR Holiday Schedule

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